

Claims

1. A combustion unit for an internal combustion engine, the unit comprising a combustion chamber having an inlet for admitting exhaust gases from the internal combustion engine, an air inlet for admitting air into the chamber, and an outlet in communication with a turbocharger having an impeller, whereby to cause gases from the chamber to drive the impeller, operation of the impeller being arranged to drive a compressor for generating a flow of air to the internal combustion engine; the chamber being arranged to cause combustion within the chamber of combustible products in the engine exhaust gas, wherein the chamber is generally of circular cross section and is arranged to have an exhaust gas inlet region which increases in cross-section in the downstream direction and into which air is introduced, a central region downstream of the inlet region in which an annular air flow is induced, and an outlet region from which the gases of combustion are discharged from the chamber outlet to drive the impeller.
2. A combustion unit according to claim 1, comprising a plurality of peripheral air inlets through which air is charged into the chamber at the outer periphery thereof and along the length of the chamber.
3. A combustion unit according to claim 1 or 2 wherein the chamber reduces in cross-section over the outlet region.
4. A combustion unit according to any one of claims 1, 2 or 3, wherein the combustion chamber is formed with an outer annular air chamber into which air from the turbo charger is introduced and from which the air is arranged to pass into the combustion chamber from a plurality of inlets.
5. A combustion unit according to any one of the preceding claims wherein there is provided over the central region, an annular region, and means for inducing a flow of gases outwardly in an annular flow, into said annular region.

6. A combustion unit according to claim 4 or 5, wherein the flow of air into the central region is arranged to assist the gases passing along the chamber to enter the annular region, the air inlets being directed generally tangentially to the walls of the chamber.

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7. A combustion unit according to claim 5 or 6, wherein air is introduced into the chamber at the radially inner sides of the annular region in the outwards direction.

8. A combustion unit according to any one of claims 4-7 wherein at the central 10 region is provided a tubular member around which is arranged the annular region, the internal dimension of the tubular member diminishing in the downstream direction and the member defining a passage out of which air is directed into the annular region, the tubular member defining means for inducing a flow of gases into the annular region.

15 9. A combustion unit according to any one of the preceding claims wherein the chamber cross-section diminishes towards the outlet and air is introduced into the outlet region to complete the combustion process.

10. An internal combustion engine having an air inlet for introducing compressed 20 combustion air into the engine, an exhaust gas outlet from the engine, a compressor for generating said compressed air flow to the engine, a compressor drive for driving the compressor, and a combustion unit providing a flow of gas for operating the compressor drive, the combustion unit having an exhaust gas inlet communicating with the exhaust gas outlet of the engine, and air inlet means for admitting air to the unit 25 from the compressor, whereby the exhaust gas, having combustible material therein, and the air are caused to mix and combust within the unit, a gas outlet from the unit communicating with the compressor drive whereby the flow of gases from the gas outlet is arranged to drive the compressor.

30 11. An internal combustion engine according to claim 10, wherein the combustion unit is in accordance with any one of claims 1-9.

12. A method of operating an internal combustion engine having a turbocharger, wherein the flow of compressed air from the turbocharger is directed into the engine, fuel is directed into the engine, exhaust gases from operating the engine are directed into a combustion unit in which combustion of combustible products in the exhaust gases is induced, and such combustion generates a flow of gas which is directed to the turbo charger which has an impeller and a compressor, the turbo charger generating a flow of pressurised air of which part is directed to the engine and part to the turbocharger.

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10 13. A method according to claim 12, wherein the fuel supply to the engine is controlled so that more fuel reaches the engine than is required to run the engine, whereby to increase the combustible material in the exhaust from the engine.

15 14. A method according to claims 12 or 13, wherein up to 8% more fuel is supplied to the engine.

15 15. A method according to any one of claims 12 - 14, wherein fuel is introduced into the exhaust gases supplied to the combustion chamber to assist combustion in the combustion unit.

20 16. A method according to any one of claims 12-15, wherein the combustion unit is of the kind defined in any one of claims 1-9.

25 17. A method according to any one of claims 12-16, wherein the engine is a diesel engine, a four stroke or a two stroke petrol engine.

18. A method according to any one of claims 12-17 wherein the internal combustion engine is in accordance with claim 10.

30 19. A combustion unit comprising a combustion chamber having an inlet for admitting gases containing combustible material, an air inlet for admitting air into the chamber, and an outlet in communication with a turbocharger having an impeller, whereby to cause gases from the chamber to drive the impeller, operation of the

impeller being arranged to drive a compressor for generating a flow of air, the chamber being arranged to cause combustion within the chamber of the combustible material, wherein the chamber is generally of circular cross section and is arranged to have a gas inlet region which increases in cross-section in the downstream direction and into which air is introduced, a central region downstream of the inlet region in which an annular air flow is induced, and an outlet region from which the gases of combustion are discharged from the chamber outlet to drive the impeller.

20. A combustion unit according to claim 19, wherein the combustion unit is an accordance with any one of claims 1-9.

21. A combustion unit for an internal combustion engine, the unit comprising a combustion chamber having an inlet for admitting exhaust gases from the internal combustion engine, an air inlet for admitting air into the chamber, and an outlet; the chamber being arranged to cause combustion within the chamber of combustible products in the engine exhaust gas, wherein the chamber is generally of circular cross section and is arranged to have an exhaust gas inlet region which increases in cross-section in the downstream direction and into which air is introduced, a central region downstream of the inlet region in which an annular air flow is induced, and an outlet region from which the gases of combustion are discharged from the chamber outlet.

22. A combustion unit according to claim 21, wherein the combustion unit is an accordance with any one of claims 1-9.

25. A combustion unit comprising a combustion chamber having an inlet for admitting gases containing combustible material, an air inlet for admitting air into the chamber, and an outlet; the chamber being arranged to cause combustion of the combustible material within the chamber, wherein the chamber is generally of circular cross section and is arranged to have a gas inlet region which increases in cross-section in the downstream direction and into which air is introduced, a central region downstream of the inlet region in which an annular air flow is induced, and an outlet region from which the gases of combustion are discharged from the chamber outlet.

24. A combustion unit according to claim 23, wherein the combustion unit is an accordance with any one of claims 1-9.